

range." There seems good reason to suppose that the Antarctic Continent, to which the South Orkneys once belonged, was formerly connected with the northern continents, probably by way of America.

Among the curiosities we may notice *Echinorhynchus antarcticus*, n.sp., from the stomach of the Weddell Seal, well described by Dr. Rennie, who compares it to a pipe with a short stem and a fantastic lid, and notes that the males are larger than the females.

We have not thought it necessary to do more than illustrate the varied interest of the reports which make up this volume, but we hope we have said enough to show that the *Scotia* has made contributions to zoology not less important than those of a meteorological kind already published. If we are to know our earth we must know the Antarctic, if we are to know the Antarctic we must know it all round, with its spring-tails as well as its magnetic mysteries, and we earnestly hope that Dr. Bruce, who is one of the most intrepid and disinterested of living geographers (in the wide and only true sense), will be encouraged by the reception given to his reports and will not be straitened in the publication of more.

#### INDIAN MINERAL RESOURCES.<sup>1</sup>

IN a recent article in an American journal, the editor remarked that "geology in Britain scorns the study of ore deposits, and it is deemed gentlemanly to investigate molluscs rather than ores, scenery rather than outcrops." Such a reproach would never have been just, though naturally certain branches of economic geology cannot be studied in this country through lack of necessary material, and Sir T. H. Holland's instructive "Sketch of the Mineral Resources of India" shows the increasing recognition by British geologists of the interesting problems of economic geology. This report is a concise summary of the mineral resources of India, and the use now made of them.

The most important Indian metalliferous minerals are now gold and manganese. The metallurgical industries for which India was once famous have been practically killed by the competition of European imports. The brass used is now all imported, and none of the old copper mines are worked, though efforts are being made to revive them. Lead ores are widely distributed, but none of them is mined. Sir Thomas Holland is careful to explain that the ruin of the local industries has been due less to the cheapness of the imported metals and chemical products than to their greater trustworthiness and uniformity.

The total value of the minerals for which returns are available amounted in 1906 to only 6,312,818l., of which gold yielded 2,230,284l. and coal 1,912,042l. The other important minerals are petroleum, manganese, salt, saltpetre, and mica; they range in value of output from petroleum, with a yield of 574,238l., down to mica, worth 259,544l. The mineral output compared with the size and population of India is, therefore, small, but Sir Thomas Holland points to a marked increase in value during the past five years, and is hopeful for its future.

The memoir opens with a short statement of the geology of India in relation to the distribution of its minerals. The author explains that, owing to the exceptional geological stability of the Indian peninsula, its rocks have been comparatively little mineralised; it is only in the very oldest that metallic ores occur in valuable quantities, and their discovery is often difficult, as they are buried under prolonged

accumulations of weathered material. In the later rocks the only minerals of economic value are those found in beds, such as coal, rock-salt, clay, and laterite. Coal mining is unusually easy and safe, owing to the slight geological disturbance of the country. Coal is sold at the pit's mouth for 3s. 11d. a ton, the low cost being due to the shallowness of the mines, the deepest shaft being only 800 feet, the firmness of the roofs of the seams, and the freedom from explosive gases; underground fires due to spontaneous combustion are, however, troublesome.

The geological foundation of India is a series of Archæan schists and gneisses with infolded areas of schists that belong to the Dahwar group. Upon this foundation rest the rocks of the Purana group, which are perhaps all pre-Cambrian. The Lower Purana beds are sedimentary rocks and limestones, and they are known as the Cuddapah series in southern, and as the Bijawar series in northern, India. The upper Purana beds are the horizontal sandstones, shales, and limestones of the Vindhya. Then, after a long break, follow the Gondwana beds, which range in age from the Upper Carboniferous to the Upper Jurassic; they contain the chief Indian coal-fields, and probably many that are still unknown, as they are buried under the Upper Cretaceous lavas of the Deccan traps.

The only important Indian gold-field is that of Kolar, in Mysore, where mining was begun in pre-historic times, and some of the ancient workings reached the depth of 500 feet. The present mines are 3000 feet deep, and it is interesting to hear, on Sir Thomas Holland's authority, that the lodes at that depth show "little diminution in value or width of the auriferous gold quartz" (p. 30).

The Indian iron ores are now comparatively little used. They are very widely distributed, and the chief ore is a quartz schist with layers of iron oxides, like the banded ironstones of Rhodesia. In most cases the ore is siliceous and of low grade. The author gives further information about the oft-reported vast block of almost solid iron (pp. 32-3) of Mayurbhanj; he tells us that one bore there gave a core of 120 feet of solid ore containing 68 per cent. of iron.

There is comparatively little information in his report on the manganese mines, the rapid development of which in recent years has been the most remarkable feature in Indian mining; but a monograph on these ores by Mr. Fermor, of the Indian Geological Survey, is announced as in the press.

Among the earthy minerals the most characteristic is mica, of which India produces half the world's supply; but Sir Thomas Holland predicts that unless better methods are adopted for its mining, the output must be greatly reduced. He deplores the practical absence of phosphates from a country where the agricultural industry is of primary importance. There is a short note on each of the gems, for which India was once famous; some diamonds are still obtained, but they are all alluvial.

The carbonaceous minerals include coal, amber, and oil. The coal is of fair quality, and now supplies practically all the fuel required on the Indian railways. Amber of the species free from succinic acid, and known as "burmite," is found in north-eastern Burmah, but the quantity is small, and most of the amber worked in India is succinite imported from Prussia. The author gives an interesting summary of the present development of the Burmese oil industry. The industry was begun by the natives, and wells are still dug by hand to the depth of 400 feet, the men wearing a diving dress for protection against the gases that collect in the shaft. The fields now yield 138 million gallons of crude oil a year,

<sup>1</sup> "Sketch of the Mineral Resources of India." By Sir T. H. Holland. Pp. xi+86; 3 maps. (London and Calcutta, 1908.)

the refined product of which is sold in China and India. The oil was until recently carried down the Irawadi in barges to the refineries at Rangoon; but a steel pipe ten inches in diameter and 297 miles long has been recently laid.

An oil-field occurs in Beluchistan and Persia in rocks of the same age as those of Burmah, but the geological conditions are unfavourable to the collection of the oil in natural underground reservoirs, and thus the western field has remained unimportant.

This valuable guide to the mineral fields of India closes with a summary of the mining laws, a bibliography, a full index, and three sketch-maps that show the distribution of oil in Burmah and of the metallic and earthy minerals throughout the Indian Empire.

J. W. G.

### COTTON GROWING IN THE WEST INDIES.<sup>1</sup>

THE history of the modern cotton industry of the West Indies forms one of the most interesting chapters in the history of agriculture. When cotton was re-introduced some six years ago it was practically a new crop to all concerned. Managers of estates had to learn the methods of cultivation and management, and labourers had to be trained. The manurial requirements of the crop required to be studied, and insect and fungoid pests had to be dealt with as they arose, to prevent them killing off the new crop. Thanks largely to the staff of the West Indian Agricultural Department, to the enterprise of the planters, and to the assistance of the British Cotton-growing Association, the crop has now become a very important one, and has been the means of improving considerably the financial position of many of these colonies.

The bulletin before us contains several important papers discussing the various phases of cotton production. Perhaps the most striking feature is the rapidity with which the industry has spread.

Cotton was first planted on a commercial scale in 1902, when about 400 acres were put into cultivation. In 1903 this area was extended to 4000 acres, in 1904 to 7000 acres, in 1905 to 9500, in 1906 to 14,500, and for the season 1907-8 20,000 acres are under culture in this crop. In addition there has been a general improvement in the quality of the lint produced since the plants have become acclimatised, and the planters have gained experience in the methods of cultivation and preparing the products. Mr. Thornton, in his general review of the progress of the industry, adduces evidence to show that further progress is possible; numerous points remain to be settled, and still greater improvements can be anticipated.

Mr. Sands's paper on the cultivation of Sea Island cotton at St. Vincent forms very pleasant reading. St. Vincent had been reduced to very bad straits. There had been a severe hurricane in 1893, and the terrible eruptions of the Soufrière in 1902-3. The unremunerative prices for arrowroot and sugar, the staple products of the island, made it impossible for the planters to retrieve their disasters. In 1903, however, the cultivation of Sea Island cotton was introduced by the Imperial Department of Agriculture, and has proved to be the means of restoring prosperity to the island; the revenue is now exceeding the expenditure, exports and imports are rising rapidly, estates are in full cultivation, and there is full employment for the peasant and labouring classes. The value of cotton exported for the year 1905-6 was 6059*l.*, for 1906-7 was 16,922*l.* The total value of the 1907-8 crop, in-

cluding exports, value of seed, &c., is estimated at 45,000*l.*

In St. Kitts cotton is grown almost entirely as an intermediate crop with sugar-cane. Up to the present no injurious effect on the sugar-cane has been noticed, and with careful manuring there seems little risk in continuing this system of planting. An agricultural inspector has been appointed to instruct the smaller growers in the best methods of working, and the prospects are considered highly satisfactory. In others of the Leeward Islands Dr. Watts has an equally satisfactory report to make; the exports from this group rose from 383,477*lb.* of lint in 1904-5 to 526,382*lb.* in 1905-6, and 702,910*lb.* in 1906-7, while a further increase is anticipated during the current season.

The Imperial Department is studying the question of seed selection, which promises to lead to still further improvement. The manurial requirements of the crop are being investigated, and schemes devised for dealing with the pests. Mr. Ballon gives a summary of his experiments on the cotton-worm, the boll-worm, cut-worms, the stainers and other pests; constant vigilance will obviously be necessary, but with a strong Department of Agriculture there is no reason to fear that the pests cannot be coped with. The progress of the industry reflects the greatest credit alike on the Department and on the planters, and augurs well for the future prosperity of the West Indies.

E. J. R.

### NOTES.

SIR RICHARD D. POWELL has been re-elected president of the Royal College of Physicians of London.

MR. T. EDISON has been awarded the gold medal of the Royal Academy of Sciences of Sweden for his inventions in connection with the phonograph.

PRINCE ALBERT OF MONACO, distinguished for his researches in oceanography, has been elected a foreign member of the Paris Academy of Sciences in succession to the late Lord Kelvin.

THE summer meeting of the Institution of Mechanical Engineers will be held this year in Liverpool, and will begin on Monday, July 26.

THE Royal Physical Society of Edinburgh—one of the oldest scientific societies in the kingdom—has now opened its doors to women members. At the March meeting of the society, Mrs. Elizabeth Gray, Edinburgh, Miss Marion I. Newbiggin, D.Sc., Edinburgh, Mrs. Ogilvie Gordon, D.Sc., Ph.D., Aberdeen, and Miss Muriel Robertson, London, were elected ordinary fellows.

REUTER's correspondent at Sydney reports that during a violent storm in the New Hebrides on March 29, Teouma was swept by a huge wave, which caused great destruction. The Government buildings at Vila were destroyed, and many vessels were stranded.

THE New York correspondent of the *Times* announces that Dr. W. H. Edwards died at Coalburo, West Virginia, on April 4, at the age of eighty-eight years. Dr. Edwards was the author of "The Butterflies of North America," a standard work on the subject, and contributed many papers on entomology to various scientific periodicals.

FROM Honolulu is reported the death, in his seventy-third year, of the Rev. Dr. Sereno E. Bishop, who had spent fifty-six years as an American missionary in the Hawaiian Islands. He was a frequent contributor to

<sup>1</sup> "West Indian Bulletin. The Journal of the Imperial Agricultural Department for the West Indies," vol. ix., No. 3, 1908.